

Original Research Article

# Burns Where Do We Stand - A Retrospective Observational Study in Tamilnadu

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## ABSTRACT

In spite of technical advances and molecular biological studies, burns continue to challenge the avenues of full proof treatment and infrastructure in terms of accessibility and affordability. Lack of committed and qualified experts and exorbitant cost due to the need for continuous care make their treatment modalities not at the reach of every one. Burn invokes an extremely traumatic experience for both the burn sufferers and also their dear relatives. In country like India, where there is large numbers of patients are presenting with burns, yet no significant epidemiological data are present. However these data are more vital for planning and understanding magnitude of the impact, incidence, measures of preventive methods and improve in the treatment modalities.

This retrospective observational study is carried out in Kanyakumari Government Medical College Hospital in Tamilnadu, with all the burns patients admitted for 3 years 2013 January to 2016 December comprising 410 patients. The pre demographic profile, cause for the burns, treatment option, outcome were tabulated and analyzed. The percentage of burns, co-morbid conditions and cause for treatment failure were analyzed.

In our study among the 410 patients studied 256 (61%) are male and 154(39%) are female. Thermal injury is the most common cause of burns (79%) and followed by electrical burns 20% and others one percentage. 61% of injuries occurred in the home and 26% at workplace and 12% in the street. 78% of injuries are accidental, 20% suicidal and 2% homicidal.

People with <20% Total surface area burns survived. But 60-80% burns 96% and >80% burns 100% suffered mortality. Septicemia and hypovolemic shock are the major cause of death. Safety precaution, first aid education and accessibility of priority care are essential to reduce the mortality and morbidity.

**Keywords:** burns. thermal, accidental, septicaemia, hypovolemic shock.

## INTRODUCTION

In this era of Industrialization people are living with mounting anxiety, melancholy, dejection and pressurized. The good buffering effect and counseling of elders in joint families are declining. Pressure builds up in families due to multiple factors and makes them susceptible to end their life by various methods. Burns has become a common presentation in the

Indian subcontinent for suicides. As per Global epidemiological data, the low and middle Income countries, especially South East Asian regions account for more than half of these burns incidents. <sup>(1)</sup> In India, annually nearly one million people are affected by moderate to severe burns injury. Burn invokes extremely traumatic experience for both the victims of burns and also their relatives. <sup>(2)</sup>

Burns results in impoverisation due to morbidity, disfigurement, contracture and prolonged hospital care. The outcome of the burns treatments depends on the golden hour intervention, accurate fluid balance maintenance and prevention of infection. For ensuring adequate wound healing without contracture needs multi-modality management. It is also pertinent to assess the etiology and root cause for the episode and give remedial counseling for the same.

The predisposing factors causing burns either accidentally or intentionally differs from region to region and data available vary on the demographical features and causative factors. The regional data are important to prioritize the steps to prevent the incidents by giving health education, safety measures, and primary and specialized care accessibility.

This study is carried out to understand the prevalence of burns incidents and availability of treatment options for burns victims in our society and prioritize our concern to improve the lacunae areas with an objective of preventing the episodes and to ensure all burns victims are receiving accessible and affordable appropriate health care.

The factors for the mortality and morbidity are based on the degree of burns, which is calculated on the basis of depth penetrations, the involvement of nerves and burns effect. Based on this burns are classified into

- First degree Burns ( Superficial Burns)
- Second degree Burns
- Third Degree Burns

The outcome also depends on the extent (or) percentage of the burns surface areas involved. The standard protocol for assessment is based on the rule of nine. It gives guidelines for the calculation of fluid replacement. The percentage is calculated for various parts of the body as per the standard guideline. <sup>(3)</sup>

## **MATERIALS AND METHODS**

This study is carried out as a retrospective study in a teaching Hospital, Department of General Surgery. All the burns patients in this medical college were treated mainly by General Surgeons, along with the supporting specialty care of Plastic surgeons and physicians. Primary data collected from the MRD department.

### **Inclusive criteria**

All the patients admitted with burns and had undergone treatment in the burns wards from 2013 January to 2016 December in the said hospital.

### **Exclusive criteria**

Patients with burns who had left the hospital against Medical advice or referred at request were not included. Out of 465 patients admitted 55 patients were not included for the above reasons.

### **Ethical clearance**

The study was presented and got approval from the Ethical committee of the concerned institution.

### **Analyses**

The patient data and demographic profiles were collected from the MRD department. Various parameters were studied as per the study proposals.

All data were checked manually and tabulated to computer excel sheet. Statistical analysis was done using statistical package for social sciences 20. Chi- Square test was used for comparison.

## **RESULTS**

### **1. Age and Gender:**

Out of the 410 patients included in the study 254 patients were male (62%) and 156 patients were female (31%). The male to female ratio is 1.6:1. Among the male, the age group of 25-34 years and women in the age group of 15-24 years had maximum burn patients. It is statistically significant ( $P < 0.05$ ). The age and gender wise distribution are shown in Table 1.

**Table 1: Age and Gender distribution (n=410)**

	Male		Female		Total	
	Number	Percentage	Number	Percentage	Number	Percentage
Children<15	20	8%	12	7.7%	32	7.8%
Teenage 15-24	48	19%	57	37%*	105	25.6%
Young Adult 25-34	103	40.4%*	25	16%	128	31.2%
Adult 35-44	37	14.6%	31	20%	68	16.6%
Old Adult 45-64	18	7%	18	11%	36	8.8%
Old Age>64	28	11%	13	8.3%	41	10%
	<b>254</b>	<b>38%</b>	<b>156</b>	<b>62%</b>	<b>410</b>	<b>100%</b>

P<0.05(chi square test) significant

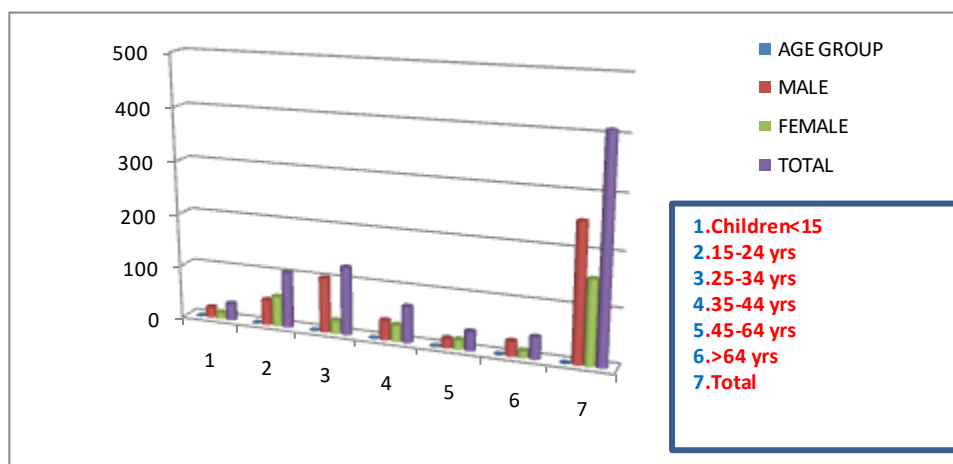
**2. Total Surface Area of Burns**

The total surface areas of burns were calculated using Rule of 9 formula for each age group. It is evident from data's shown in table 2, the age group of 25-34 years had suffered more extensive burns and had the highest surface area of burns with mean ±SD of 62% with ±31 which is statistically significant (P<0.01).

**Table 2: Total surface area of burns with age group**

Age group(in years)	Mean ±SD TBSA in %	Median TBSA in %
<15	15±34	55
15-24	55±33	50
25-34	62±31*	83
35-44	47±38	30
45-64	49±34	45
>65	33±29	20

Significant (P<0.01), TBSA-Total Body Surface Area



**Figure 1: Age and gender distribution**

**3. The Frequency of surface area involved in male to female.**

Majority of the patients were admitted with 20-40 percentage burns (32%) followed by less than 20 percentage burns (25%). Female outnumbered male in >80 % burns. Most of the female patients had more total surface area burns. The data are tabulated in table 3.

**Table 3: Frequency of burns surface area Male vs Female**

Burns	Total number of case		Total male case		Total female case	
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
<20%	103	25%	77	30.7	25	16%
21-40%	131	32%	78	30.7	53	34%
41-60%	29	7%	29	11.4	0	Nil
61-80%	69	17%	45	17.7	24	15%
81-100%	78	19%	24	9.5	54	35%
Total	410	100	254	100%	156	100

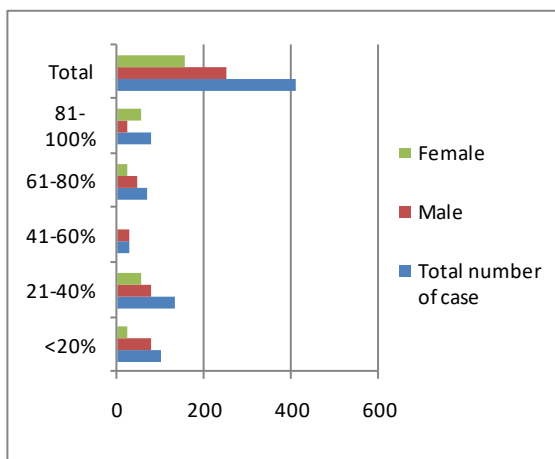


Fig. 2: Frequency of burns surface area Male vs Female

#### 4. Causes of Burn

The thermal injury was the most common cause of burns in 79% followed by electrical burns in 20% and others 1%. Electrical and chemical burns were significantly more in male than women ( $P < 0.05$ ). In the pediatric age group of under 15 years, the common cause of injury is by electrical than thermal which is statistically significant ( $P < 0.05$ ). The data are tabulated in table 4.

Table 4: Causes of Burn injury (n=410)

	Male	Female	Total	Pediatrics < 15 yrs.
Thermal	162 (40%)	124 (30.2%)	286	12
Electrical	58 (14%)	31 (7.5%)	89	20
Chemical	33 (8%)	1 (0.3%)	34	-
lighting	1	0	1	-
	254 (62%)	156 (38%)	410	32

#### 5. Place of occurrence and Nature of Injury

The sites of occurrence of burns were noted. Majority of patients had household burns mainly involving LPG and kerosene stoves. Work place burns contributed for 26.58% of burns. The data are tabulated in table 5.

Table 5: Place of occurrence of burns injury

Pattern of Burn Injury	Frequency	Percentage
<b>Place of Occurrence</b>		
Home	252	61.46
Work place	109	26.58
Street	49	11.95

#### 6. Type of Burn Injury

It is noted 78% burns occurred due to the accidental injuries mainly involving LPG or kerosene stoves, 22% burns are due

to suicidal attempts and 2% burns due to the homicidal method. The data are tabulated in table 6.

Table 6: Types of burn injury in male and female

Mode of Burn	Total N(%)	Male N(%)	Female N(%)	P
Accidental	319(78)	228(90%)	91(58%)	<0.001
Suicidal	82(20)	22(9%)	60(39%)	<0.001
Homicidal	9(2)	4(1%)	5(3%)	<0.383
Total	410(100)	254(100%)	156(100%)	

Statistically significant differences ( $P < 0.05$ ) P value for comparison between male and female.

#### 7. Cause of Death and relation to period of hospitalization before death, N=180

In our study comprising 410 patients, 180 patients had the fatal end result. The common cause of death was hypovolemic shock in the early period and septicemia in later period. The cause of death in relation to duration of hospitalization is tabulated in Table 7.

Table 7: Cause of Death and period of hospitalization

	Septicemia	Hypovolemic shock	other	Total
<24 hour	20	62	-	82
24-48 hr	3	6	-	9
3-4 days	9	18	-	27
5-7 days	33	-	-	33
8-30 days	22	-	-	22
>81 days	3	-	4	7
	90	86	4	180

#### 8. Anatomical location of Burns Injuries

Different Anatomical areas were involved. The parts involved are tabulated in table 8. It is noted more than one site is involved in many patients.

Table 8: Anatomical location of burns

Sites of burns	sites	%
Head and neck	386	22%
Anterior trunk	280	16%
Posterior trunk	87	5%
Upper Limb	490	28%
Lower Limb	420	24%
Perineum and genitalia	87	5%
<b>Total</b>	<b>1750</b>	<b>100%</b>

#### 9. Correlation Death with total surface area of burns

Depending upon the surface area mortality is observed. All burns above 80 percentage succumbed and out of 69

patients with 60-80 percentage of burns three of them were saved resulting in the death percentage as 96. All patients under 20 percentage of burns were saved. On the correlation of total body surface area of burns and the outcome, it is noted, and when TBSA is more than 80%, no patients would be saved. The relation of TBSA and outcome are tabulated in Table 9.

**Table 9: Death in relation to total body surface area of burns**

Burns TBSA	Total number of Cases		Total number of Death	
	Frequency	Percentage	Frequency	Percentage
<20%	103	25%	Nil	Nil
21-40%	131	32%	16(131)	21%
41-60%	29	7%	21(29)	72%
61-80%	69	17%	66(69)	96%
81-100%	78	19%	78(78)	100%
Total	410	100	180	

Significant (P<0.01), TBSA-Total Body Surface Area

## DISCUSSION

In developed countries where the dedicated case is offered and an appropriate pre- hospital care is provided the mortality due to burns are decreasing. However in developing countries especially in public hospital where people come with more total surface area burns without proper primary care the mortality remains high. (4) In our study the mortality is 44% ‘Goudar B.V et al has reported 42% mortality in a teaching hospital. (5) Dr. M. Subramaniam et al in 1996 from a study in a district hospital in Western India reported an overall mortality

of 56.5 %. (6) 40% mortality rate was reported, in another study by Gupta et al. (7) Gowri et al had reported low fatality rate with 31.58 %. (8) Dr. Jayaraman et al in his study conducted in Madras with 1368 patients have reported the death of nearly 58.9% patients in Burns victims. (9)

Most of the death occurs within 7 days of admission and the survival depends on various factors. 60-100% burns most often ends in mortality in public hospital and with 40-60% burns 70% ends in mortality due to septicemia. Early death is due to hypovolemic shock. The appropriate fluid replacement is the crucial factors to prevent the early occurrence of death as hypovolemic shock contribute the major cause of death in the first two days. Steps should be taken to popularize the burns fluid management protocol in all primary health care set up. Once with adequate fluid replacement patient survive in the early days more care must be given to control the secondary infection. Dedicated burns unit with barrier nursing will improve the status.

Our study shows 62% of burns victims were male and 38% were female. In a review of published articles on epidemiology, there is the difference in the male to female ratio as depicted in table 10.

**Table 10: Male to female ratio in Burns victims**

Study	Total patients included in the study	Male	Female
Wani M et al (12)	428	272(39%)	156(61%)*
Gauder B V et al	174	60(34.5%)	114(65.5%)*
Shunmuga Krishna (13)	150	62(41.3%)	88(58.7%)*
Mohamed Osawa (10)	275	175(63.6%)*	100(36.4%)
Anwar Nukhbazia (11)	1470	842(57.3%)*	628(42.7%)
Jayalal et al	410	254(61%)*	156(39%)

In our study the most common etiology of the burns is accidental followed by suicidal and homicidal attempts and is consistent with studies conducted by Toon et al., Turegun et al., and Maghsoudi et al. (14-16)

Accidental Burn constitutes the major cause of burns. On detailed analysis, inadequate precaution and knowledge on the gas stove in the household are the

commonest causes. Most often lack of knowledge on the protective safety measures, ignorance and also lack of preventive care are the main reasons for the higher frequency of accidental burns in the house. It is also noted the adequate first aid is not provided to many patients as many myths prevail in the society.

In our study 40% of patients who had come to our hospital, after primary care



at local level, had no adequate fluid replacement or scientific first aid care. They were referred to our hospital with no reference slips.

Many deaths occurred within 24 hours, (82%) and most often it is due to hypovolemic shock. Adequate knowledge of need of primary fluid balance maintenance is lacking among the public, and it shall be the primary step to ensure the health care system is to be equipped with knowledge and skill on fluid replacement

In our study, 20% causes of burns are due to suicidal attempts. Most often it is common in the female of 20-30 years of age with various attributable stress situations including marriage relations, love failure, job failure etc. 2% remains homicidal in nature and the commonest reason is related to dowry problem and improper sexual relationship. As mental health is often a neglected subject in rural areas and no provision of early detection and support are available, most often they end their life in minor abrasions.

An electrical burn constitutes 20% of the burn injury and is often results in morbidity rather than mortality. 50% of the individuals who had electrical burns had undergone some kind of amputations. Especially in pediatric age group electrical burns constitute more than 50%.<sup>(13)</sup> Proper insulation of wires, precautions in handling the electrical points is important to reduce this incident.

In our study, 3 patients had chemical injury among which one is an acid attack. The government is taking adequate steps to prevent such attacks and ensure proper care is provided to their victims. One individual had a severe lightning injury and died in the hospital within 24hrs.

Most of these burns are preventable and the morbidity and mortality associated can be curtailed if more care and protocol based high end treatment is accessible to the public at their nearest place.

## CONCLUSION

Most common cause of accidental burns is unawareness and lack of knowledge and accessibility to safety precautions. It is important to reduce the burns mortality, preventive measures to empower the public on safety precaution and proper first aids for burns victims for early appropriate management is necessary. Every taluk and PHC level public hospital must be equipped to give primary care to burns victims. Counseling and life skill education are necessary to reduce stress and suicidal impulses.

The fire safety training and infrastructure must be made mandatory for all public places and also in household settings. Special helplines may be instituted to enable the public to get adequate care in times of emergency.

Occupational hazards like the electrical burns must be countered with the adequate supply of insulator protective wears and safety thresholds in the electrical circuit. Proper educations on the first aid protocol for different type of burns must be made known to all public especially teachers, hotels, taxi drivers, police etc.

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